



# Converging Technologies for Improving Human Performance

Nanotechnology, Biotechnology, Information Technology & Cognitive Science

February 24-25, 2005  
Sheraton Keauhou Bay Resort & Spa  
Kailua-Kona, HI

## Supporting Organizations

American Institute of Chemical Engineering  
Center for Cognitive Liberty & Ethics  
Center for NanoSpace Technologies, Inc.  
Center for NanoSystems Institute  
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## Media Partners

Forbes/Wolfe Nanotech Report  
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## Event Producer:

**BizTechComm.com**  
Business & Technology Communications, Inc.

Join the world's leading experts from industry, academia and government who will showcase methods for integrative technologies for improving human performance.

- Converging new technologies in industry and medicine
- Human-machine interface
- Enhancement of cell functions
- Computer interfaces with nano-bio-cognitive components
- Brain, mind and behavior
- Reshaping organizations and business
- Legal and ethical issues
- International research activities
- Government programs

## Program Co-Chairs

**William Sims Bainbridge, Ph.D.**

*Director, Science and Engineering Informatics Program, National Science Foundation*

**Carlo Montemagno, Ph.D.**

*Deputy Director, California Nano Systems Institute, Co-Director, Institute for Cell Mimetic Space Exploration (CMISE) and Roy and Carol Doumani Professor and Chair, Department of Bioengineering, University of California, Los Angeles (UCLA)*

**Mihail C. Roco, Ph.D.**

*Senior Advisor, National Science Foundation and Chair, National Science and Technology Council's Subcommittee on Nanoscale Science, Engineering and Technology (NSET)*

## Call for Poster Presentations

Attendees are invited to submit an abstract for a poster presentation to give at this conference. The format of the conference will involve speakers presenting to plenary sessions with an audience, and we expect that these presentations will be published as a book. If you are interested in taking advantage of this opportunity, please submit a brief abstract for consideration to [info@biztechcomm.com](mailto:info@biztechcomm.com).

## PRE-CONFERENCE LUNCHEON WORKSHOP: NEW FRONTIERS IN NANOSCIENCE

Wednesday, February 23, 2005, 12:00 - 5:00 p.m.

Presented and hosted by:



Just  
Announced

12:00	<i>Workshop Begins</i>
12:15 - 1:00	APPLICATIONS OF ORGANOSILANE SELF-ASSEMBLED MONOLAYERS (SAMs) TO SURFACE NANOASSEMBLIES <b>Osamu Taki</b> - Nagoya University Japan
1:00 - 1:45	NEW NANOPROBES <b>Jim Gimzewski</b> - UCLA
1:45 - 2:30	<b>Fraser Stoddard</b> - UCLA AN INTEGRATED SYSTEMS-ORIENTED APPROACH TO MOLECULAR ELECTRONICS
2:30 - 3:00	<i>Morning Refreshment Break</i>
3:00 - 3:45	ENGINEERING OF VAULTS AS FLEXIBLE, TARGETABLE NANO-SCALE CAPSULES <b>Lenny Rome</b> - UCLA
3:45 - 4:30	NANOENGINEERING HIGHER ORDER OF FUNCTION INTO LIVING SYSTEMS <b>Carlo Montemagno</b> - UCLA
5:00	<i>Event Reception</i>

This pre-conference workshop is being hosted by CNSI and all attendees from the Converging Technologies for Improving Human Performance conference are encouraged to attend. To register for this workshop, please go to [www.cnsi.ucla.edu](http://www.cnsi.ucla.edu).

# **Converging Technologies for Improving Human Performance**

## **Nanotechnology, Biotechnology, Information Technology and Cognitive Science**

**February 24 & 25, 2005, Sheraton Keauhou Bay Resort & Spa, Kailua-Kona, HI**

### **Program Description**

As nanotechnology, biotechnology, information technology, and cognitive science advance, researchers are now discovering new ways to integrate their findings. This convergence will bring new approaches to what are currently very diverse areas of research - converging technology platforms, physical and mental performance, human-machine interface, human cognition and communication, learning, work efficiency, and many others. On their own, each of these technologies offers the potential for extraordinary advancement, but combined their potential is enormous and may provide revolutionary advancement in human longevity, quality of life, learning and productivity.

In 2002, the National Science Foundation and Department of Commerce issued the first report on converging technologies for improving human performance, and its outcome is already reflected in several NSF projects. The report asserts that converging technologies is "a broad, cross-cutting, emerging and timely opportunity of interest to individuals, society and humanity in the long-term." It also states, "It is far-reaching and fundamental, urging the transformation of science, engineering and technology at its very roots. The new developments will be revolutionary and must be governed by respect for human welfare and dignity."

This conference has been designed and will be co-chaired by Drs. William Sims Bainbridge, Carlo Montemagno and Mihail C. Roco. Dr. Bainbridge is Director of the Science and Engineering Informatics Program of the NSF, and has directed the division's Human Computer Interaction, Universal Access, and Knowledge and Cognitive Systems Program. Dr. Montemagno is Deputy Director, California Nano Systems Institute; Co-Director, Institute of Cell Mimetic Space Exploration (CMISE); Roy and Carol Doumani Professor and Chair, Department of Bioengineering at the University of California, Los Angeles (UCLA). Dr. Roco is a Senior Advisor at the NSF, and Chairs the U.S. National Science and Technology Council's Subcommittee on Nanoscale Science, Engineering and Technology (NSET). He also oversees the National Nanotechnology Initiative. Drs. Roco and Bainbridge were co-editors of the NSF/DOC report "Converging Technologies for Improving Performance" (Kluwer, 2003), and Drs. Roco and Montemagno were co-editors of "Coevolution of Human Potential and Converging Technologies" (Annals of the New York Academy of Sciences, 2004).

The potential of converging technologies for influencing and defining the future of the new products and services, and ultimately of human performance, is very broad. If you are interested in hearing directly from industry, government, research and educational leaders who will showcase methods for integrating knowledge to improve human performance, including presentations on convergence products and manufacturing processes already in development, you cannot afford to miss this event.

### **Who Should Attend**

Representatives from industry, academia and government interested in converging new technologies, and their human, societal and economic implications. Experts in nanotechnology, biotechnology, information technology and human sciences from all fields, such as science, technology, policy analysts, social sciences.

### **Program Logistics**

#### **Venue & Accommodations:**

Sheraton Keauhou Bay Resort & Spa

78-128 Ehukai Street, Kailua-Kona, HI 96740

Group rate: \$165.00 per night available until January 24, 2005.

To receive this special rate, please contact their group reservations at (866) 912-4026 and mention that you are part of the Converging Technologies group.

#### **Program Schedule:**

##### **Day One - Thursday, February 24, 2005**

Registration & Continental Breakfast: 7:00 - 8:00 a.m.

Conference in Session: 8:00 a.m. - 5:00 p.m.

##### **Day Two - Friday, February 25, 2005**

Registration & Continental Breakfast: 7:30 - 8:00 a.m.

Conference in Session: 8:00 a.m. - 4:30 p.m.

#### **Event Producer:**

Business & Technology Communications, Inc.

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Sherman Oaks, CA 91403

Phone No.: (818) 907-6707

Fax No.: (818) 783-5493

Website: [www.biztechcomm.com](http://www.biztechcomm.com)

#### **Registration Information and Details:**

Corporate registration fee: \$950.00

Academic, Non-Profit & U.S. Government registration fee: \$750.00

The registration fee is due prior to the conference and includes continental breakfasts, lunches, refreshments and a detailed conference CD of speaker's presentations that are available.

#### **Team Discounts:**

Register 3 or more from your same organization at the same time and receive a 10% discount off of the conference registration fee. Register a team of 5 or more and receive a 15% discount off of the conference registration fee.

#### **Cancellations and Substitutions:**

Substitutions can be made at any time. All cancellations will carry a 15% administration fee. Please confirm your cancellation in writing at least 10 working days prior to the first day of the event. No refunds will be made for cancellations received less than 10 working days prior to the event.

Business & Technology Communications, Inc. reserves the right to make changes to the program or to cancel it if minimum attendance is not met or when conditions beyond its control prevail. If the program is not held for any reason, Business & Technology Communications' liability is limited to the refund of the registration fee only.

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## Nanotechnology, Biotechnology, Information Technology and Cognitive Science

### February 24 & 25, 2005, Sheraton Keauhou Bay Resort & Spa, Kailua-Kona, HI

## Program Agenda - Day One

### Thursday, February 24, 2005 - Day One

8:00 - 8:15 *Welcome and Introduction by Conference Co-Chair*

#### SESSION I: OVERVIEWS

8:15 - 8:45 OPPORTUNITIES AND UNCERTAINTIES OF CONVERGING NEW TECHNOLOGIES

**Mihail C. Roco, Ph.D.**, Senior Advisor, National Science Foundation and Chair, National Science and Technology Council's Subcommittee on Nanoscale Science, Engineering and Technology (NSET)

8:45 - 9:15 GETTING TO "MIND" WITH THE ENGINES OF CREATION

**Carlo Montemagno, Ph.D.**, Deputy Director, CNSI, Co-Director, CMISE, and Roy and Carol Doumani Professor and Chair, Department of Bioengineering, University of California, Los Angeles

9:15 - 9:45 CONCEPTS FOR CONVERGENCE: EIGHT IDEAS THAT CAN UNIFY SCIENCE

**William Sims Bainbridge, Ph.D.**, Director, Science and Engineering Informatics Program, National Science Foundation

9:45 - 10:15 TECHNOLOGICAL INTEGRATION OF NBIC

**Terry A. Michalske, Ph.D.**, Director, Center for Integrated Nanotechnologies, Sandia National Laboratories

10:15 - 10:30 *Morning Refreshment Break*

10:30 - 11:00 INDUSTRIAL PERSPECTIVE FOR NBIC INTEGRATION WITH OTHER TECHNOLOGIES AND SOCIETY

**James Spohrer, Ph.D.**, Director, Almaden Services Research & Innovation Champion, IBM

#### SESSION II: NANO-BIO FOUNDATION FOR CONVERGING TECHNOLOGIES

11:00 - 11:30 THREE LEVELS OF NEUROELECTRONIC INTERFACING; SILICON CHIPS WITH ICON CHANNELS, NERVE CELLS AND BRAIN TISSUE

**Peter Fromherz, Ph.D.**, Professor and Director, Department of Membrane and Biophysics, Max Planck Institute of Biochemistry

11:30 - 12:00 SIGNAL-TRANSDUCING PROTEINS FOR NANOELECTRONICS

**Fabio Pichirri, Ph.D.**, Associate Professor, COE, Laboratory, Tohoku University

12:00 - 1:30 *Group Lunch*

1:30 - 2:00 FUSION OF TECHNOLOGY DOMAINS FOR NEXT GENERATION OF MOLECULAR DIAGNOSTIC SYSTEMS

**Frederic Zenhausern, Ph.D.**, Director, Center for Applied Nanobioscience, Technical Director, Center for Flexible Display, Arizona State University; Associate Director, Molecular Diagnostics & Target Validation Division, Translation Genomic Research Institute (TGen)

2:00 - 2:30 BIOMIMETIC NANOTECHNOLOGY

**Osamu Takai, Ph.D.**, EcoTopia Science Institute and Department of Materials, Physics and Energy Engineering, Graduate School of Engineering, Nagoya University

#### SESSION III: INFORMATION AND COGNITIVE FOUNDATIONS FOR CONVERGING TECHNOLOGIES

2:30 - 3:00 MATHEMATICS COMMUNICATION AND COGNITION WITH THE BLIND

**Francis K.H. Quek, Ph.D.**, Professor, Computer Science, Virginia Tech

3:00 - 3:15 *Afternoon Refreshment Break*

3:15 - 3:45 TITLE TO BE ANNOUNCED

**Narendra Ahuja, Ph.D.**, Donald Biggar Willet Professor, Department of Electrical and computer Engineering, Beckman Institute, and Coordinated Science Laboratory, University of Illinois at Urbana-Champaign (Tentative)

#### SESSION IV: TECHNOLOGICAL INTEGRATION AND IMPLICATIONS

3:45 - 4:15 NEW COMPANIES AND INDUSTRIES

**Michael Darby, Ph.D.**, Professor of Policy, Director of the John M. Olin Center for Policy, Anderson Graduate School of Management, University of California, Los Angeles

4:15 - 4:45 CONVERGING TECHNOLOGIES: NEED FOR RISK MANAGEMENT IS MORE THAN EVER

**Jayshree Pandya, Ph.D.**, PMP, Founder and CEO, Risk Group

4:45 - 5:00 *Closing Remarks for Day One by Conference Co-Chair*

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### February 24 & 25, 2005, Sheraton Keauhou Bay Resort & Spa, Kailua-Kona, HI

## Program Agenda - Day Two

### Friday, February 25, 2005 - Day Two

9:00 - 9:15	<i>Welcome to Day Two &amp; Recap of Day One by Conference Co-Chair</i>
9:15 - 9:45	SENSOR SYSTEMS FOR DYNAMIC SOCIAL INTERACTION <b>Henry Kautz, Ph.D.</b> , Professor, Department of Computer Science and Engineering, University of Washington
9:45 - 10:15	ENVIRONMENTAL <b>Branden Allenby, Ph.D.</b> , Professor, Civil & Environmental Engineering, Arizona State University (Tentative)
10:15 - 10:30	<i>Morning Refreshment Break</i>
10:30 - 11:00	CONVERGING TECHNOLOGIES AND EVOLVING HUMAN RIGHTS; IMPROVING THE HUMAN TERMS OF NBIC SCIENCE AND TECHNOLOGY ETHICS <b>Wyre Sententia</b> , Co-Director, Center for Cognitive Liberty & Ethics

### SESSION V: EDUCATION AND TRAINING

11:00 - 11:30	EDUCATION FOR CONVERGING NEW TECHNOLOGIES <b>Robert D. Balmer, Ph.D.</b> , Dean of Engineering and Computer Science, Union College
11:30 - 12:00	TRAINING MEDICAL TEAMS IN IMMERSIVE ENVIRONMENTS <b>Janis A. Cannon-Bowers, Ph.D.</b> , Institute for Simulation and Training, University of Central Florida
12:00 - 1:00	<i>Group Lunch</i>
1:00 - 1:45	PANEL DISCUSSION: NANO-BIO-INFO-COGNO Moderator: <b>William Sims Bainbridge, Ph.D.</b> , Director, Science and Engineering Informatics Program, National Science Foundation Panelists: <b>Janis A. Cannon-Bowers, Ph.D.</b> , Institute for Simulation and Training, University of Central Florida <b>Henry Kautz, Ph.D.</b> , Professor, Department of Computer Science and Engineering, University of Washington <b>Francis K.H. Quek, Ph.D.</b> , Professor, Computer Science, Virginia Tech

### SESSION VI: LEGAL AND ETHICAL ASPECTS

1:45 - 2:00	CONVERGING TECHNOLOGIES: THE THREAT TO AMERICAN JURISPRUDENCE <b>Sonia E. Miller</b> , Attorney-at-Law, S.E. Miller Law Firm
2:00 - 2:20	CONVERGING TECHNOLOGIES POLICY DEVELOPMENT IN THE U.S. & E.U.: PUBLIC SCIENCE AT THE NANOSCALE <b>Nigel M. de S. Cameron, Ph.D.</b> , President, Institute of Biotechnology and the Human Future, and Research Professor of Bioethics and Associate Dean, Chicago-Kent College of Law; Illinois Institute of Technology
2:20 - 2:40	THE PROBLEM OF PATENT THICKETS IN CONVERGENT TECHNOLOGIES <b>Gavin Clarkson, DBA, JD, MBA</b> , School of Information, School of Law, Native American Studies, University of Michigan
2:40 - 3:00	REGULATING CONVERGING TECHNOLOGIES: BENEFIT OR THREAT? <b>Alan S. Ziegler</b> , Attorney-at-Law, Sweeney Lev LLC
3:00 - 3:15	<i>Afternoon Refreshment Break</i>
3:15 - 3:45	PANEL DISCUSSION: LEGAL ISSUES OF NBIC Moderator: <b>Sonia E. Miller</b> , Attorney-at-Law, S.E. Miller Law Firm Panelists: <b>Nigel M. de S. Cameron, Ph.D.</b> , President, Institute of Biotechnology and the Human Future, and Research Professor of Bioethics and Associate Dean, Chicago-Kent College of Law; Illinois Institute of Technology <b>Gavin Clarkson, DBA, JD, MBA</b> , School of Information, School of Law, Native American Studies, University of Michigan <b>Alan S. Ziegler</b> , Attorney-at-Law, Sweeney Lev LLC
3:45 - 4:30	VISIONS OF CONVERGENCE: NEXT 10, 20, 100 YEARS Conference Co-Chairs  <i>Conference Concludes</i>

*Agenda as of 1/26/05*